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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/584,379	04/11/2007	Adam Samuel Best	TS6454US	1281
23632	7590	10/07/2011	EXAMINER	
SHELL OIL COMPANY			WEINER, LAURA S	
P O BOX 2463			ART UNIT	
HOUSTON, TX 772522463			PAPER NUMBER	
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/584,379

**Applicant(s)**

BEST ET AL.

**Examiner**

/Laura Weiner/

**Art Unit**

1726

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 September 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12, 15-17, 19, 20, 22 and 23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 15-17 is/are allowed.
- 6) ☒ Claim(s) 1-6, 8-11, 19, 20, 22 and 23 is/are rejected.
- 7) ☒ Claim(s) 7 and 12 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-946)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB-08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No.(s)/Mail Date: \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

1. Applicant's amendment filed 9-28-2011 has been considered but is moot in view of the new ground(s) of rejection.

### ***Election/Restrictions***

2. Applicant's election without traverse of Group I, claims 1-23 and the elected species, a rechargeable battery comprising a cathode comprising  $\text{LiCrTiO}_4$ , an anode comprising lithium metal and an electrolyte comprising an anion and a cation comprising a pyrrolidinium ring structure having the formula N-methyl-N-butyl-pyrrolidinium and further comprising an alkali salt in the reply filed on 10-15-2010 is acknowledged. A cathode comprising  $\text{LiCrTiO}_4$  was found allowable so  $\text{Li}_4\text{Ti}_5\text{O}_{12}$  was searched.

### ***Claim Rejections - 35 USC § 102***

3. Claims 1-5, 10-11, 22-23 are rejected under 35 U.S.C. 102(e) as being anticipated by Ohzuku et al. (7,722,989).

Ohzuku et al. teaches in column 22, claim 1, 9a battery comprising an electrode and a second electrode comprising  $\text{Li}_4\text{Ti}_5\text{O}_{12}$  where the battery is designed charge/discharge range of not greater than 2.8V. Ohzuku et al. teaches in column 23, claims 10 and 11, that the battery further comprises at least one ionic liquid selected from pyrrolidinium, etc. Ohzuku et al. teaches in column 11, lines 28-34, that in order to

ensure safety during overcharge by having a shutdown function of stopping a current between the electrodes by contracting and crushing micropores of the separator upon reaching a temperature of about 135 degrees C. Ohzuku et al. teaches in column 15, lines 41-56, that the electrolyte comprises a lithium salt such as LiBF<sub>4</sub>, LiPF<sub>6</sub>, etc. Ohzuku et al. teaches in column 7, lines 58-67, that the cathode comprises PVDF as a binder. Ohzuku et al. teaches in column 14, lines 9-30, that the binder can be PVDF or PTFE.

***Claim Rejections - 35 USC § 103***

4. Claims 1-6, 8-11, 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohzuku et al. (7,722,989) in view of Hollenkamp et al. (WO 2004/082059).

Ohzuku et al. teaches in column 22, claim 1, 9a battery comprising an electrode and a second electrode comprising Li<sub>4</sub>Ti<sub>5</sub>O<sub>12</sub> where the battery is designed charge/discharge range of not greater than 2.8V. Ohzuku et al. teaches in column 23, claims 10 and 11, that the battery further comprises at least one ionic liquid selected from pyrrolidinium, etc. Ohzuku et al. teaches in column 11, lines 28-34, that in order to ensure safety during overcharge by having a shutdown function of stopping a current between the electrodes by contracting and crushing micropores of the separator upon reaching a temperature of about 135 degrees C. Ohzuku et al. teaches in column 15, lines 41-56, that the electrolyte comprises a lithium salt such as LiBF<sub>4</sub>, LiPF<sub>6</sub>, etc. Ohzuku et al. teaches in column 7, lines 58-67, that the cathode comprises PVDF as a

binder. Ohzuku et al. teaches in column 14, lines 9-30, that the binder can be PVDF or PTFE.

Ohzuku et al. teaches the claimed invention except does not teach that the pyrrolidinium has a ring structure or have the formula N-methyl-N-butyl-pyrrolidinium and contain an anion comprising BF<sub>4</sub><sup>-</sup>.

Hollenkamp et al. teaches a secondary battery comprising an electrolyte comprising a pyrrolidinium based ionic liquid. Hollenkamp et al. teaches on page 3, that the electrolyte comprises a cation of Formula I where X is N and R<sub>1</sub> and R<sub>2</sub> is an alkyl, R<sub>3</sub>-R<sub>6</sub> are hydrogens. Hollenkamp et al. teaches on pages 8-9, that the term "alkyl" is used to mean any straight chain alkyl group of from 1-20 carbon atoms preferably from 1-10 atoms in length and encompasses methyl, ethyl, propyl, butyl, etc. Hollenkamp et al. teaches on page 5, that the secondary lithium battery comprises a positive electrode, a negative electrode, a separator and an electrolyte. Hollenkamp et al. teaches on page 28 in Example 1, an electrolyte comprising lithium bis(trifluoromethanesulfonyl)amide in methyl butyl pyrrolidinium bis(trifluoromethanesulfonyl) amide. Hollenkamp et al. teaches on pages 11-12, that the anion can be BF<sub>4</sub><sup>-</sup>, sulfonyl amides, etc. Hollenkamp et al. teaches on page 6, that the cells were conducted at 50 degrees C and teaches on page 11, that the device can operate from -30 to 200 degrees C where higher temperature devices operate in the 40 to 150 degrees C region. Hollenkamp et al. teaches in page 32, Example 10, that the electrolyte used in Example 1 was used in a cell comprising a lithium negative electrode

and a  $\text{LiMn}_2\text{O}_4$  [voltage of less than 4 V] positive electrode.

discloses the claimed invention except for specifically teaching that

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use methyl butyl pyrrolidinium in place of pyrrolidinium taught by Ohzuku et al. as the cation because Hollenkamp et al. teaches that this cation and  $\text{BF}_4^-$  as the anion can be used in the electrolyte as explained above and one would expect therefore that this cation and anion material would function in a similar way and give similar results.

#### ***Claim Rejections - 35 USC § 112***

5. Claims 19-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 19 is rejected because it is unclear how the anode can comprise  $\text{Li}_4\text{Ti}_5\text{O}_{12}$  when the cathode comprises  $\text{Li}_4\text{Ti}_5\text{O}_{12}$  as cited in claim 1 from which the claim depends from. It is unclear how the anode can comprise  $\text{LiTi}_2\text{O}_4$  when the cathode comprises  $\text{LiTi}_2\text{O}_4$  as cited in claim 1 from which the claim depends from. It is unclear how the anode can comprise  $\text{Li}_{4-y}\text{Mg}_y\text{Ti}_5\text{O}_{12}$  when the cathode comprises  $\text{Li}_{4-y}\text{Mg}_y\text{Ti}_5\text{O}_{12}$  as cited in claim 1 from which the claim depends from.

Claim 20 is rejected because it is unclear how the anode can comprise  $\text{Li}_{4-y} + b\text{Mg}_y\text{Ti}_5\text{O}_{12}$  when the cathode comprises  $\text{Li}_{4-y}\text{Mg}_y\text{Ti}_5\text{O}_{12}$  as cited in claim 1 from which the claim depends from.

***Allowable Subject Matter***

6. Claims 7 and 12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
7. Claims 15-17 are allowed.

***Conclusion***

8. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to /Laura Weiner/ whose telephone number is (571)272-1294. The examiner can normally be reached on M-H (6:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Laura Weiner/  
Primary Examiner  
Art Unit 1726

September 30, 2011